

REMARKS — General

By the above amendment, Applicants have amended the claims to define the invention more particularly and distinctly so as to overcome the technical rejections and define the invention patentably over the prior art.

The Objection To The Claims

The O.A. noted that claims 9, 10, 23, and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims in the paragraph 18 of the O.A. In the same paragraph, the O.A. also noted that none of the prior art of record disclose an apparatus and method which includes the step of performing contact-free interaction is possible regardless whether the vehicle's windows is open or closed, and the step of processing results involves updating a digital content when the user is looking at the display system.

Applicants rewrote claims 9 and 23 (as currently amended claims) in independent form including all of the limitations in the previous base claims 1 and 15, respectively, as noted in the O.A.

Applicants rewrote claims 10 and 24 as dependent on the rewritten independent claims 9 and 23, respectively, including all of the limitations in the rewritten independent claims.

The Rejection Of The Claims 10 and 24 Under § 112

The O.A. noted that as per claim 10 (as exemplary of claims 10 and 24), the phrase "said digital" has no antecedent basis.

Applicants rewrote claims 10 and 24 (as currently amended claims) to have proper antecedent basis for the limitation in the claims, respectively, and to more particularly define the invention in a patentable manner, according to the O.A.

The Rejection Of The Claims Under § 112

The last O.A. rejected claim 5 (as exemplary of claims 5 and 19), line 3, under MPEP §2173.05(d), as the phrase “some examples” renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

Applicants canceled claims 5 and 19, and the limitations in claims 5 and 19 have been integrated into new claims 29 and 37, respectively, to more particularly define the invention in a patentable manner, by clarifying that the limitations in claims 5 and 19 are not part of the claimed invention but the limitations are given only as exemplary embodiments of the claimed invention, according to the O.A.

Applicants rewrote claims 10 and 24 to overcome the rejection in paragraph 6 of the O.A. as noted above.

Accordingly applicants request reconsideration of this rejection.

The Rejection Of The Claims Under § 103

The O.A. rejected claims 1-7, 11, 13-21, 25, 27 and 28, under 35 U.S.C. 103(a), as being unpatentable over Quinn et al. (4,638,312) (hereinafter Quinn) in view of Lyons et al. (6,283,860) (hereinafter Lyons).

Applicants amended the claims as follows.

The Rejection Of Claims 1 and 15

The O.A. rejected independent claims 1 and 15 on Quinn and Lyons. Claim 1 has been canceled and all of the limitations in claim 1 have been integrated into the currently amended claim 9 (indicated to contain allowable subject matter) as limitations of the newly made independent claim to define patentably over these references, and any combination thereof.

Claim 15 has been canceled and all of the limitations in claim 15 have been integrated into the currently amended claim 23 (indicated to contain allowable subject matter) as limitations of the newly made independent claim to define patentably over these references, and any combination thereof.

The Dependent Claims Are a Fortiori Patentable Over Quinn and Lyons

New dependent claims 29 to 36 incorporate all the subject matter of claim 9 and add additional subject matter, which makes them a fortiori and independently patentable over these references.

New dependent claims 37 to 44 incorporate all the subject matter of claim 23 and add additional subject matter, which makes them a fortiori and independently patentable over these references.

In addition to this, applicants request reconsideration of these rejections, as now applicable to claims 29 to 44, for the following reasons:

(1) Fundamental approaches of the image processing in the prior arts are different from that of applicants. For example, Lyons' approach is for the user who is standing in front of the system, not a driver who is sitting in a vehicle. Lyons' approach for feature position detection does not explain about how to get such information for the driver in a vehicle, whose upper body can only be seen, but not the entire body. Especially, Lyons described an embodiment of determining a foot position of a foot of the user, (Lyons col. 3, lines 26-30), which is not at all applicable to the driver in a vehicle in a drive-thru situation.

Consequently, the application domains where the technologies are applied to and how the image processing is done are also fundamentally very different between Lyons and applicants.

Lyons listed various applications where their invention can be employed, such as libraries, art galleries, museums, shopping systems in public shopping areas, warehouse shops, department

stores, and even public service facilities, such as fast-food providers, (Lyons col. 2, lines 61-67 and col. 3, lines 1-4). All of these examples are based on building structures, not mobile objects such as vehicles in a drive-thru environment. Whereas, the applicants' system is intended to be used in a drive-thru environment. This clearly shows the difference of application domain between those two approaches.

(2) The novel features of claims 29 to 44 produce new and unexpected results and hence are unobvious and patentable over these references. Applicants' novel approach for using the contact-free interaction in a drive-thru environment creates a unique experience to the user and unobvious over the prior art.

(3) There is no justification, in Quinn and Lyons, or in any other prior art separate from applicants' disclosure, which suggests that these references be combined, much less be combined in the manner proposed. Even if Quinn and Lyons were to be combined in the manner proposed, the proposed combination would not show all the novel methods and physical features of claims 29 to 44, since neither of them mentions about the contact-free interaction in the domain of a drive-thru environment.

The References and Differences of the Present Invention Thereof

Prior to discussing the claims and the above three points, applicants will first discuss the references and the general novelty of the present invention and its unobviousness over the references. The differences, in addition to the above three points, can be summarized as follows.

(1) Contact-free interface is not introduced in either of the prior art. Contact-free interface in applicants' system enables a user to select virtual image objects on a display without physically touching any device in a novel way in a drive-thru interaction. Implementing a contact-free

interface is known to be a significantly difficult task in the practiced art of computer vision image processing. For example, hand tracking and gesture recognition using camera in computer vision is one way to implement the contact-free interface. Many researchers in the art have been studying how to come up with a more robust and reliable hand-tracking algorithm. Due to this difficulty, the usage of contact-free interface has not been found in many commercial products. Applicants use a commercially successful embodiment of contact-free interface for the image object selection process and user interaction in a novel way. This embodiment is cited as a prior art in reference, provisional patent application filed by R. Sharma, N. Krahnstoevers, and E. Schapira, Method and System for Detecting Conscious Hand Movement Patterns and Computer-generated Visual Feedback for Facilitating Human-computer Interaction, U.S. Provisional Patent filed, April 2, 2002 (hereinafter Sharma). This novel usage of a contact-free interface in applicants' drive-thru virtual touch ordering system results in a unique experience to the user.

(2) Eye level screen adjustment for displaying output purpose without using any mechanical movement is not introduced in any of the prior arts. In applicants' system, the contact-free interaction provides convenience in the driver's movement for giving the input to the system. Since the image capturing system can adjust to a reasonable degree within the field of view, according to the driver's position, the driver does not have to park the vehicle precisely and painstakingly in a very narrow certain position in order to use the system. The eye level screen adjustment for displaying output provides the convenience to the driver from the output point of view. Depending on the user's height or the vehicle's height, the display region on the display device can adjust the height electronically and graphically without moving any mechanical parts

or device in the system (Krahnstoevers et al., Fig. 7, 532, 550, and page 23 first paragraph, lines 1- 12).

(3) Data collection by the automated system in the manner proposed in the applicants is not shown in either Quinn or Lyons. Getting the exemplary statistics, such as amount of time to finish the interaction, demographic data, traffic measurement, and customer behavior, is an important value in the applicants' system (Krahnstoevers et al., page 11, last paragraph, lines 7-21, and page 12, first paragraph, lines 1-2).

Discussions for the references are as follows.

Quinn disclosed a system for ordering and an order entry, with a display and an aiming selector to make selections among the items shown on the display. However, the usage of the aiming selector is a very cumbersome interaction method. It is especially true in a drive-thru ordering situation, since the driver not only has to pay extra attention for the safety of the vehicle, but also he has to drive the vehicle to a location where the person could pick up the selector and effectively make the selection interactions. This will cause significant delay in the ordering process, thus reducing the overall throughput. Since the driver/user has to physically touch the selector, maintaining the device, such as protecting the device from wear and tear loss and keeping the device hygienically clean, will become difficult and expensive. Depending on the weather condition, such as snow, rain, or very hot temperature, this could aggravate the problem and make the user's interaction uncomfortable. Whereas applicants' contact-free interaction allows the driver much more freedom for parking the vehicle. Applicants' interaction method also reduces maintenance cost, while increasing the throughput of the ordering process flow.

Furthermore, Quinn's method does not have any concept of image processing by camera, as it is also noted in the O.A.

Lyons disclosed a system for displaying a set of options on a screen and making selections by a user standing in front of the screen. Lyons' method for determining the selection process is based on an image of the user alone, (Lyons col. 2, lines 8-12). However, Lyons approach is for the user who is standing in front of the system, and not a driver who is sitting in a vehicle. Lyons' approach for feature position detection does not explain about how to get such information for the driver in a vehicle, whose upper body can only be seen, but not the entire body. Especially, Lyons described an embodiment of determining a foot position of a foot of the user (Lyons col. 3, lines 26-30), which is not applicable to the driver in a vehicle in a drive-thru situation at all. Lyons also listed various applications where their invention can be employed, such as libraries, art galleries, museums, shopping systems in public shopping areas, warehouse shops, department stores, and even public service facilities, such as fast-food providers, (Lyons col. 2, lines 61-67 and col. 3, lines 1-4). All of these examples are based on building structures, not mobile objects such as vehicles in a drive-thru environment. Whereas the applicants' system is intended to be used in a drive-thru environment. This clearly shows the difference of application domain between those two approaches.

Furthermore, when the application domains are different, how the image processing is done is also fundamentally different between Lyons and applicants. For example, the usage of background subtraction in the image processing technology is highly susceptible to the changes in the background images, and the way the background changes between the different application domains are significant. In a drive-thru environment, various vehicles can come and go in very

unpredictable ways. Applicants disclosed a novel usage of the silhouette and background subtraction algorithm (Krahnstoevers et al., page 21, last paragraph, lines 22, and page 22, first paragraph, lines 1-13) for the vehicle window detection, which is not shown in Quinn or Lyons.

The Rejection Of Claims 8, 12, 22, and 26

The O.A. rejected claims 8, 12, 22, and 26 on Quinn, Lyons, and Kenyon (4,735,289). In addition to the fact that the claims are now dependent on the newly rewritten independent claims 9 and 23, respectively, and the differences between Quinn and Lyons and applicants, the differences between Kenyon and applicants are discussed as follows.

Kenyon disclosed a dispensing system, which is used from an open window of a stationary vehicle. Kenyon's data input and dispensing system is moved mechanically after sensing the position of the open window optically and acoustically. Kenyon's system tries to help a user to reach the system more easily by moving the dispensing system mechanically. However, since the driver/user has to physically touch the system, the maintenance problem, such as protecting the device from wear and tear loss and keeping the device hygienically clean, as discussed above about Quinn's system, still remains. Again, depending on the weather condition, such as snow, rain, or very hot temperature, this could aggravate the problem and make the user's interaction uncomfortable. Whereas applicants' contact-free interaction allows the driver much more freedom for parking the vehicle.

As the O.A. also noted Kenyon suggests a dispensing apparatus and deposit for driver up machines in which the dispensing component is moved by the carriage mechanism in response to the sensed signal to the position and the height of the vehicle (Kenyon fig. 3a to 4). Kenyon's

mechanical carriage system will suffer from high maintenance cost by the mechanical movement of the system and the physical contact by the driver in the interaction process.

Applicants disclosed eye level screen adjustment for displaying output purpose without using any mechanical movement, which is not introduced in any of the prior arts. In applicants' system, depending on the user's height or the vehicle's height, the display region on the display device can adjust the height electronically and graphically without moving any mechanical parts or device in the system (Krahnstoevers et al., Fig. 7, 532, 550, and page 23 first paragraph, lines 1-12). For this functionality, the enclosure in applicants can be equipped with vertically elongated display screens. For example, the display system in applicants can position the display screen in a portrait style or use plurality of the normal display screens in a landscape style put together on top of another, in which the plurality of the display screens eventually make the entire screen a portrait style display screen. The eye level screen adjustment is done by changing the position of the "main content display region" in the display screen (Krahnstoevers et al., Fig. 7, 532, 550, and page 23 first paragraph, lines 1-12), but not moving the display screen physically or mechanically.

Kenyon disclosed a detection means, which is capable of detecting the car body in optical or acoustic type, (Kenyon, col.3, lines 3-42). Kenyon's optical detector uses infra-red type device, which detects reflection of the infra-red light from the vehicle body, whereas applicants disclosed a novel usage of the silhouette and background subtraction algorithm (Krahnstoevers et al., page 21, last paragraph, lines 22, and page 22, first paragraph, lines 1-13) for the vehicle window detection, which is not shown in Kenyon.

Again, new dependent claims 29 to 36 incorporate all the subject matter of rewritten independent claim 9 and add additional subject matter, which makes them a fortiori and independently patentable over these references.

Claim 29 further adds a step for showing elements that can be selected or manipulated by the contact-free interaction. Neither Quinn nor Lyons mentions the selection by a contact-free interaction for the person who is sitting in a vehicle.

Claim 30 further adds a step for using one or a plurality of image-capturing devices for the capturing said plurality of input image of the person and the contact-free interaction by the person in a vehicle. Quinn nor Lyons mentions using a plurality of image-capturing devices for the person who is sitting in a vehicle.

Claim 31 further adds a step for allowing a certain degree of spatial freedom in parking a vehicle and the interaction. Neither Quinn nor Lyons do this.

Claim 32 further adds a step for adjusting the main content display region in the display system according to the vehicle's parking position and said person's height. This is clearly foreign to Quinn, Lyons, and Kenyon as discussed above.

Claim 33 further adds a step for collecting a plurality of data about the person who uses the system and the interaction by the person. This is clearly foreign to Quinn and Lyons.

Claim 34 further adds a step for processing the detection of said person's vehicle and a localization of the vehicle window applying the background subtraction algorithm in a novel way. Neither Quinn nor Lyons has the novel usage of the background subtraction algorithm in a drive-thru interaction.

Claim 35 further adds a step for performing face detection and hand tracking for the contact-free interaction in a drive-thru application. Neither Quinn nor Lyons do face detection and hand tracking for the contact-free interaction in a drive-thru application.

Claim 36 further adds a step for allowing said person to purchase food items or non-food items, such as pharmaceuticals, or where it is designed to provide services, such as banking, using the contact-free interface. Neither Quinn nor Lyons do this.

Again, new dependent claims 37 to 44 incorporate all the subject matter of rewritten independent claim 23 and add additional subject matter, which makes them a fortiori and independently patentable over these references.

Claim 37 further adds means for showing elements that can be selected or manipulated by the contact-free interaction. Neither Quinn nor Lyons mentions the selection by a contact-free interaction for the person who is sitting in a vehicle.

Claim 38 further adds means for using one or a plurality of image-capturing devices for the capturing said plurality of input image of the person and the contact-free interaction by the person in a vehicle. Quinn nor Lyons mentions using a plurality of image-capturing devices for the person who is sitting in a vehicle.

Claim 39 further adds means for allowing a certain degree of spatial freedom in parking a vehicle and the interaction. Neither Quinn nor Lyons do this.

Claim 40 further adds means for adjusting the main content display region in the display system according to the vehicle's parking position and said person's height. This is clearly foreign to Quinn, Lyons, and Kenyon as discussed above.

Claim 41 further adds means for collecting a plurality of data about the person who uses the system and the interaction by the person. This is clearly foreign to Quinn and Lyons.

Claim 42 further adds means for processing the detection of said person's vehicle and a localization of the vehicle window applying the background subtraction algorithm in a novel way. Neither Quinn nor Lyons has the novel usage of the background subtraction algorithm in a drive-thru interaction.

Claim 43 further adds means for performing face detection and hand tracking for the contact-free interaction in a drive-thru application. Neither Quinn nor Lyons do face detection and hand tracking for the contact-free interaction in a drive-thru application.

Claim 44 further adds means for allowing said person to purchase food items or non-food items, such as pharmaceuticals, or where it is designed to provide services, such as banking, using the contact-free interface. Neither Quinn nor Lyons do this.

Accordingly applicants submit that the dependent claims are a fortiori patentable and should also be allowed.

References Cited As Being Of General Interest

Lucero disclosed a credit card payment system in drive-thru (Lucero col. 2, lines 12-15), which includes a panel with touch responsive switches for menu selection (Lucero col. 2, lines 55-57). Lucero is similar to an example of the touch-screen display drive-thru system, which could suffer from wear and tear losses due to the physical contact from the user to the system as mentioned in applicants' application (Krahnstoevers et al., page 4 last paragraph lines 16-22, page 5 first paragraph lines 1-3). Although Lucero mentioned the protection of the system from vandalism (Lucero col. 8, lines 49-51, col. 10, lines 31-39), the system will still suffer from the high

maintenance cost by the physical contact by the driver in the interaction process and mechanical movement of the system. Applicants' contact-free interaction will not have this kind of problem.

Mueller disclosed an integrated customer self order system in fast food restaurants. Mueller mounted a touch screen overlay on the customer terminal, in which customer interaction with the system consists of the customer's physical contacts to the touch screen overlay, using a finger, hand, or a stylus, (Mueller col. 4, lines 18-28). Mueller is foreign to the contact-free interface, and it will suffer from high maintenance cost problem for the wear and tear, as it is also noted in (Krahnstoevers et al., page 4 last paragraph lines 14-17).

Camaisa et al. disclosed a portable interactive visual ordering system. Whether it is a portable PC implementation using a laptop computer (Camaisa et al. col. 11, lines 57-67, and col. 12, lines 1-11), a standalone Kiosk implementation using a touch screen kiosk (Camaisa et al. col. 12, lines 35-47), a portable PC implementation with wireless LAN (Camaisa et al. col. 12, lines 60-65), or a remote ordering system from a restaurant (Camaisa et al. col. 13, lines 25-34), Camaisa et al. is foreign to the contact-free interface in an automated drive-thru ordering system. Camaisa et al. will also suffer problems of high maintenance cost for these implementations as it is also noted in (Krahnstoevers et al., page 4 last paragraph lines 14-17).

Pentel disclosed a remote ordering system for a drive-thru, which consists of an input device. Pentel's input device consists of a keypad, a battery, a first processor, and a transmitter, which is cumbersome and faces similar problems, such as weak signal problem or extra cost increase for the device distribution, as in the U.S. Patent No. 6,026,375 of Hall et al., which is described in applicants' application, (Krahnstoevers et al., page 3, last paragraph, lines 14-22, and page 4, first paragraph, lines 1-2). If the restaurant owner assigns a hand-held device to each customer as in

(Pentel, col. 2 lines 32-36), the cost for distributing the device will increase. Even after distributing the device, the cost for maintenance and the cost for wear and tear, such as bookkeeping the device location, replacing broken parts, or changing the batteries, will become a problem not to mention the additional labor cost to do so. If the device is lost, as people easily forget where they put their remote controller for a TV set home, the usage of the device will become useless. If the users are to carry the device in their cars, it will occupy space in an already crowded inside space of the cars unnecessarily. Applicants contact-free interface does not have these problems.

Harakawa disclosed a 3-D coordinates determination apparatus from an information inputting person using a plurality of video cameras. However, Harakawa does not mention how the method can be applied to the drive-thru environment. For example, the 3-D coordinates of a reference point of the information inputting person is determined on the basis of the height of the person and the position of the person on the floor surface (Harakawa col. 15, lines 11-32), which are not at all applicable to the driver in a vehicle. In a drive-thru application, the height of the person is highly subject to the height of the vehicle, since the driver is sitting in the vehicle and the position of the person on the floor is not available.

Maruno et al. disclosed an interface apparatus, which tries to control an appliance easily without conventional interface such as keyboard and mouse. **Iwamura** disclosed a motion detector circuit, which is related to a remote control commander for an electronic appliance, such as a television set. **Grzeszczuk et al.** disclosed a gesture recognition system in three dimensions using computer vision technologies on stereo images and color information. Maruno et al., Iwamura, and Grzeszczuk et al. failed to mention contact-free interaction in a drive-thru system

and its application environment. As applicants mentioned, the contact-free interface of the applicants' system can be implemented using any of the reliable real-time gesture recognition technologies in the computer vision (Krahnstoevers et al., page 9 last paragraph lines 16-21). However, it is clearly foreign to Maruno et al., Iwamura, and Grzeszczuk et al. to adapt their technologies to the drive-thru application domain, since neither none of Maruno et al., Iwamura, Grzeszczuk et al. mentions how the technologies can be applied into the drive-thru specifications, such as detection of the user and hand inside a vehicle while the user is sitting inside the vehicle.

The Ownership of the Claims That Was Not Commonly Owned

The O.A. advised applicants of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Applicants assigned the ownership from applicants to the assignee Advanced Interfaces, Inc. according to the general employee agreement at the time of their employment. In addition to this, applicants will also file a Recordation of the publicly notarized assignments of the ownership to the USPTO. Therefore, applicants do not own any claims commonly or individually in the application.

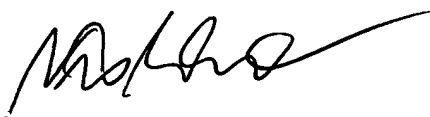
CONCLUSION

For all the above reasons, applicants submit that the specification and claims are now in proper form, and that the claims all define patentably over the prior art. Therefore they submit that this application is in condition for allowance now, which action they respectfully solicit.

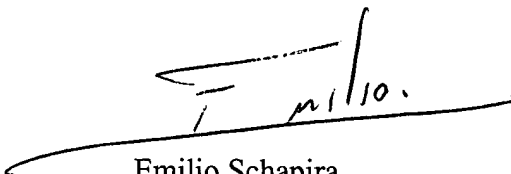
Conditional Request for Constructive Assistance

Applicants have amended the specification and claims of this application so that they are proper, definite, and define novel structure, which is also unobvious. If, for any reason this application is not believed to be in full condition for allowance, applicants **very respectfully request** the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 2173.02 and § 707.07(j) in order that the undersigned can place this application in allowable condition.

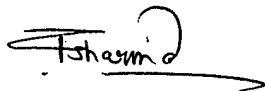
Very respectfully,



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Date: 7/18/2005 Inventor's Signature: 